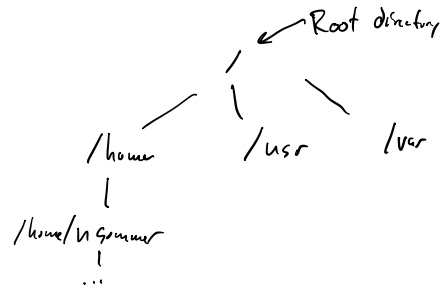
Path names

- Absolute path
  - Path to the file starting at a file system root

POSIX `/home/sommer/file.txt`

Windows `C:\Users\sommer\Documents`

- Relative path
  - Does not start with the root directory
  - Relative to the working directory
  - Every process has a working directory



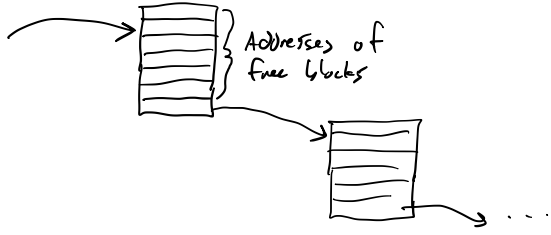
- Directory tree
  - File systems are organized in a tree starting at the root directory
  - Leaves are files and empty directories

OS Role

- Store the block locations for all files and directories in a filesystem
- Stores them on the disk itself

keeping track of free blocks

- Linked list
  - Store the lists of free blocks in the free blocks themselves



- Bitmap
  - Store 1 bit for every block on disk
  - Bit is 1 if free, 0 if used
  - More space efficient unless the disk is becoming full

File system Layout

- Master boot record (MBR)
  - Stores the partition table, which indicates how the hard drive is divided up into separate filesystems
- Each partition is formatted with a particular filesystem type
  - Writes information about the filesystem to the partition's superblock (chunk of information about the filesystem)
  - OS must be aware of the filesystem type
- inodes (POSIX systems)
  - Blocks that store attributes and disk block locations of filesystem objects (files and directories)
  - Every file requires at least 1 inode, more if it takes up many blocks

- Contiguous storage
    - Desireable on hard disks
    - Easy when there is a lot of free space
    - Hard when there is not much free space or when files grow
- Directories
    - Need to map names to inodes
    - Often use a hash table
- Symbolic links (shortcuts in Windows)
    - Can turn a directory tree into a DAG